

SPECIFICATION AMENDMENTS:

Please replace the paragraph on page 2, lines 10 through 19, with the following amended paragraph:

--Therefore, especially in an exposure apparatus using an exposure light source having a short wavelength, a self-cleaning method referred to as optical cleaning is additionally used, by which ultraviolet light having a wavelength of 200 nm or less is emitted from a light ~~source~~ source, and an optical system is irradiated with the ultraviolet light to cut off with strong energy of the ultraviolet light a chemical bond of a carbon compound, which is a main component of contaminants adhering to a surface of this optical system, thereby decomposing the compound.--

Please replace the paragraphs starting on page 2, line 20 through page 5, line 13 with the following amended paragraphs:

--For example, Jpn. Pat. Appln. KOKAI Publication No. 1993-335206 describes a technology, by which in a projection type exposure apparatus comprising an illumination optical system 1 for emitting illumination light, a filter 3 for passing through it only a wavelength useful to exposure by the illumination light, an exposure mask 4 on which a necessary exposure pattern is formed, a projection optical system 5 for projecting the exposure pattern to a subject 10 to be processed, a holder 6 to which the subject to be processed is

mounted, and a stage 7 for moving the holder 6 with respect to the projection optical system 5, ~~in 5.~~ In its self-cleaning, an ultraviolet light filter 2 is placed in an optical path in place of the filter 3 and the exposure mask 4, so that the holder 6 is irradiated with ultraviolet light that has passed through this ultraviolet filter 2 through the projection optical system 5 in order to oxidize and remove organic foreign matters and impurities adhering to this holder 6.

However, a conventional projection type exposure apparatus has the following problems. That is, since the ultraviolet light filter 2 is placed on the optical path in place of the filter 3 and the exposure mask 4, the same positions along the same optical path as those in the case of ordinary exposure are irradiated with ultraviolet light for optical cleaning. Therefore, it is impossible to remove the contaminant adhering to a position other than the ordinary exposure path, so that the remaining contaminant might move to the exposure path and it might have a bad influence on the exposure path.

SUMMARY OF THE INVENTION

To solve these problems, ~~claims 1-3 of the present invention each provide~~ provides a self-cleaning method for a semiconductor exposure apparatus comprising a light source for emitting ultraviolet light for exposure, an optical system for guiding ultraviolet light emitted from the light source to an exposure mask on which an exposure pattern is formed, and a projection lens

for projecting the exposure pattern to a subject to be processed, the method comprising the steps of arranging, in place of the exposure mask, a transmittable plate for diffusing ultraviolet light guided by the optical system and irradiating the projection lens with the ultraviolet light; and irradiating an entire surface of the projection lens with the ultraviolet light emitted from the light source and diffused by the transmittable plate to optically clean a surface of the projection lens.

~~Claims 4-6 of the~~ The present invention each provide also provides a self-cleaning method for a semiconductor exposure apparatus comprising a light source for emitting ultraviolet light for exposure, an optical system for guiding ultraviolet light emitted from the light source to an exposure mask on which an exposure pattern is formed, and a projection lens for projecting the exposure pattern to a subject to be processed, the method comprising the steps of arranging, in place of the exposure mask, a transmittable plate for converging ultraviolet light guided by the optical system and irradiating the projection lens with the ultraviolet light; and irradiating a middle of the projection lens with the ultraviolet light emitted from the light source and converged by the transmittable plate to optically clean an inside of the projection lens.

~~Claims 7-10 of the~~ The present invention each provide further provides a self-cleaning transmittable plate in a semiconductor exposure

apparatus comprising a light source for emitting ultraviolet light for exposure, an optical system for guiding ultraviolet light emitted from the light source to an exposure mask on which an exposure pattern is formed, and a projection lens for projecting the exposure pattern to a subject to be processed, the self-cleaning transmittable plate being arranged in place of the exposure mask to clean the projection lens with the ultraviolet light, the self-cleaning transmittable plate diffusing or converging ultraviolet light guided by the optical system to irradiate the projection lens with the ultraviolet light.--

Please replace the paragraph starting on page 7, line 16 through page 8, line 2 with the following amended paragraph:

--As shown in FIG. 1A, this semiconductor exposure apparatus has a measurement-purpose light source 11 for emitting ultraviolet light having an ultra-short ~~wavelength~~ wavelength, such as ArF excimer light having a wavelength of 193 nm or F2 light having a wavelength of 157nm. On an output side of the light source 11 a light source-side optical system 12 is arranged, on an output side of which a mirror 13 is provided. Ultraviolet light whose optical path has been altered by the mirror 13 by 90 degrees is guided to a condenser lens 14, by which condenser lens 14 the ultraviolet light is output as an incoherent and parallel light. On an output side of the condenser lens 14, an original plate holder 16 is provided for setting an original pattern plate 15 to it.--

Please replace the paragraphs starting on page 18, line 6 through page 20, line 13 with the following amended paragraphs:

~~--According to claim 1 of the present invention, in~~ In place of an exposure mask, a transmittable plate ~~is~~ may be arranged so that ultraviolet light emitted from a light source may be diffused through this plate and a projection lens may be irradiated with it. It is thus possible to optically clean a surface of the projection lens efficiently using a simple configuration.

~~According to claim 2 of the present invention, the~~ The transmittable plate can be constituted of a quartz glass plate having a lens-shaped concave portion in its surface or a quartz glass plate having bracelet-shaped concave lenses concentrically arranged in its surface, so that it is possible to irradiate an entire surface of the projection lens with ultraviolet light efficiently with little attenuation of the ultraviolet light.

~~According to claims 3 and 9 of the present invention, the~~ The transmittable plate ~~is~~ may be made of a quartz glass plate having a lens-shaped concave portion formed in one surface and bracelet-shaped concave lenses formed concentrically in the other surface of the plate, so that it is possible to efficiently diffuse ultraviolet light more widely.

~~According to claim 4 of the present invention, in~~ In place of the exposure mask, the transmittable plate ~~is~~ may be arranged so that ultraviolet light emitted from the light source may be converged through this plate and the

projection lens may be irradiated with it. It is thus possible to optically clean surfaces of inner side lenses of the projection lens efficiently using a simple configuration.

~~According to claim 5 of the present invention, the~~ The transmittable plate can be constituted of a quartz glass plate having a lens-shaped convex portion on its surface or a quartz glass plate having bracelet-shaped convex lenses concentrically arranged on its surface, so that it is possible to irradiate a middle of the projection lens with ultraviolet light efficiently with little attenuation of the ultraviolet light.

~~According to claims 6 and 10 of the present invention, the~~ The transmittable plate is may be made of a quartz glass plate having a lens-shaped convex portion formed on one surface and bracelet-shaped convex lenses formed concentrically on the other surface of the plate, so that it is possible to efficiently converge ultraviolet light to a smaller range.

~~According to claim 7 of the present invention, in~~ In place of the exposure mask, the transmittable plate is may be arranged so that ultraviolet light emitted from the light source may be diffused or converged through this plate and the projection lens may be irradiated with it. It is thus possible to optically clean the surface or the inner side of the projection lens efficiently using a simple configuration.

~~According to claim 8 of the present invention, the~~ The self-cleaning transmittable plate ~~is~~ may be made of a quartz glass plate having a lens-shaped concave or convex portion on its surface or a quartz glass plate having bracelet-shaped concave or convex lenses concentrically arranged on a surface thereof. It is thus possible to diffuse or converge ultraviolet light and irradiate the projection lens with it efficiently with little attenuation of the ultraviolet light.--